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FOREST INSECT AND DISEASE CONDITIONS IN NEWFOUNDLAND AND LABRADOR IN 1989

by L.J. Clarke, W.J. Sutton, E.C. Banfield, D.M. Stone, D.S. O'Brien, K.E. Pardy and G.C. Carew

INFORMATION REPORT N-X-275
1990

FORESTRY CANADA
NEWFOUNDLAND & LABRADOR REGION

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ISSN NO. 0704-7657
CAT. NO. Fo46-15/275E
ISBN NO. 0-662-17903-X

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ABSTRACT

This report summarizes forest pest conditions in Newfoundland and Labrador in 1989 and was compiled from information collected in 12 Forest Insect and Disease Survey Districts. Major pests of fir, spruce, pine and larch forests and deciduous tree species are discussed in detail and pests of lesser importance are tabulated.

RÉSUMÉ

Ce rapport est un résumé de la situation des ravageurs forestiers à Terre-Neuve et au Labrador en 1989. Les renseignements qu'il contient proviennent du relevé des insectes et des maladies des arbres effectué dans 12 districts. Les ravageurs des forêts de sapin d'épinette, de pin et de mélèze et ceux des espèces feuillues font l'objet d'un exposé détaillé et les les ravagers de moindre importance sont présentés sous forme de tableau.

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ACKNOWLEDGEMENTS

Information for this report is based on the results of surveys conducted by all personnel of the Forest Insect and Disease Survey and research officers of the Forest Protection Section. The cooperation of the Provincial Department of Forestry, providing technicians, casual workers, inventory maps and aircraft time for insect and disease assessment and the forest industry for providing inventory figures is gratefully appreciated. We thank M.F. Gillingham and J. Rockwood for typing this report.

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INTRODUCTION

Forest insect and disease conditions for 1989 and forecasts for 1990 are reviewed in this report. The information for this report is compiled from observations and field records of the Forest Insect and Disease Survey Rangers and other survey personnel. The region is divided into 12 ranger districts with the following responsible for the districts; D.M. Stone, Humber - St. Georges; D.S. O'Brien, St. Barbe - White Bay; E.C. Banfield, Grand Falls - Hermitage - Gander; W.J. Sutton, Bonavista - Burin - Avalon - Port Hope Simpson - Goose Bay. Other survey personnel in 1989 were: J. Hudak, Head, Forest Insect and Disease Survey; L.J. Clarke, Chief Ranger; A.G. Raske, Entomologist; K.E. Pardy, Insectory Technician, Identification and Insect Collection; G.C. Carew, Pathology Technician, Identification and Herbarium Collection. The Forest Insect and Disease Survey Districts and the Provincial Forest Management Units are included for reference in Figures 1 and 2.

SUMMARY

Weather conditions throughout late April, May and June were warm and dry throughout most of the Province initiating tree and insect development about one week ahead of 1988. Early July tended to be sunny, windy and cool, but warm and humid for the remainder of July. August was

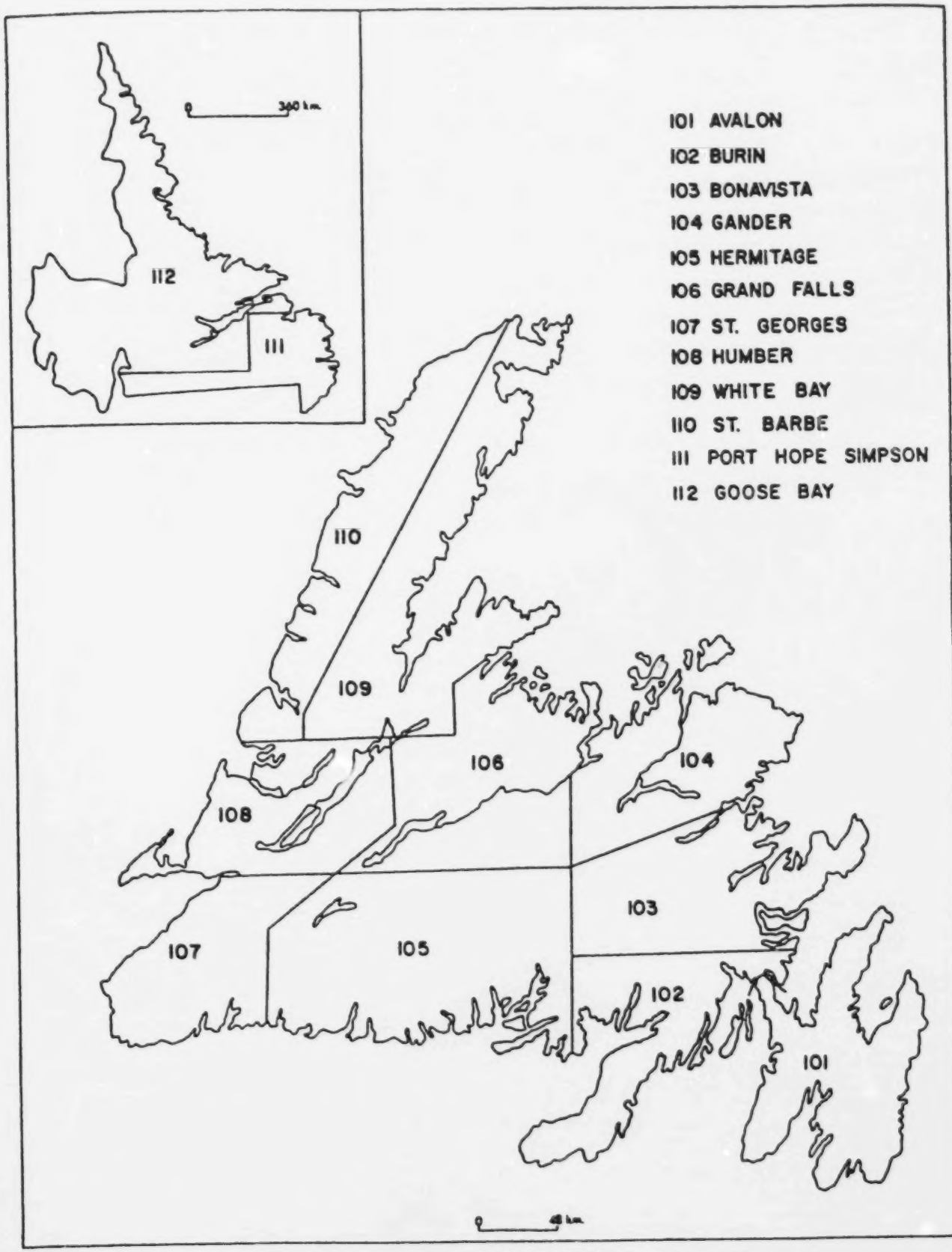

Figure 1. Forest Insect and Disease Survey Districts.

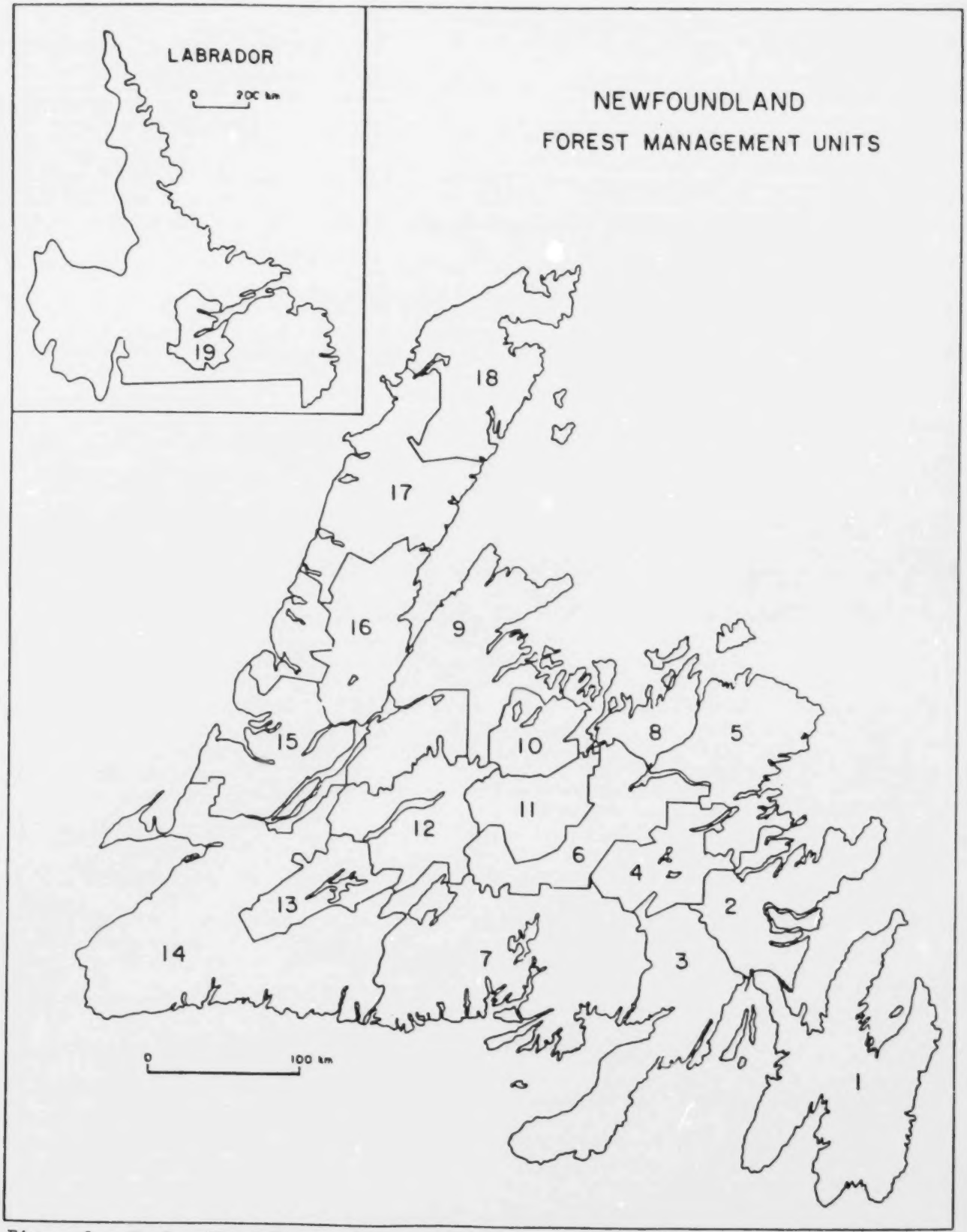

Figure 2. Newfoundland Forest Management Units.

mostly warm and wet. September was mostly sunny with a few days of record breaking temperatures.

The **hemlock looper** caused the most damage in the forests of the Island in 1989. The **blackheaded budworm** caused severe defoliation and contributed to some tree mortality where it was interspersed with the hemlock looper infestation. The **spruce budworm** moth flights increased along the west coast and as far as Bishop Falls in central Newfoundland. The **balsam woolly adelgid** damage was more prominent in both thinned and natural regenerating stands. **Black army cutworm** population levels were low in plantations in western and central Newfoundland. The **larch sawfly** infestation collapsed on the Avalon Peninsula. The **European pine sawfly** population levels were high on ornamental pines throughout the St. John's and Mount Pearl areas. A new pest, the **fungus gnat**, caused severe damage and some mortality on white spruce seedlings in the Wooddale nursery. The **birch casebearer** populations increased this summer throughout most of the Island.

High populations of the **satin moth** caused severe defoliation of poplars in several towns along the east coast. The **northern spruce engraver**, a bark beetle, was collected from two locations in Labrador. High numbers of **white-marked tussock** moth were recorded near Overfalls Brook and South Branch. The **mountain-ash sawfly** population levels were high throughout the Island. The **ugly nest caterpillar** caused severe defoliation of hardwoods along the Lower Humber River and Overfalls Brook. The **poplar leaf beetle** caused severe defoliation near the Goose River in Labrador. High population levels

of **twig aphids** damaging pines, spruce and fir were reported from several areas of the Avalon Peninsula. **Forest tent caterpillar** and **gypsy moth** pheromone traps did not detect any possible introduction of these pests to the Island. The **striped alder sawfly** caused severe defoliation in several areas throughout the Island. The **spider mite** caused severe damage to ornamental spruce trees in private gardens in the St. John's area. This mite caused the foliage to turn brown and drop prematurely.

Shoe string root rot caused severe tree mortality in a young stand of balsam fir previously damaged by the hemlock looper and was suspected of causing tree mortality in other stressed stands. **Scleroderris canker** was recorded in new locations on the Avalon Peninsula. The plant parasite, **dwarf mistletoe** affected black spruce trees of various ages near Gambo. **Broom rust of balsam fir** was very common and widespread throughout the Island. A high incidence of **needle rust of spruce and fir** was recorded in several localities throughout the Province. **Sirococcus shoot blight** affected white spruce seedlings in the Wooddale nursery. **Gray mould blight** was common in some nursery beds of black spruce at the Wooddale nursery. **European poplar canker** affected most Lombardy poplar trees throughout the Clarenville area. A moderate incidence of **leaf and shoot blight** of poplar was common and widespread throughout central Newfoundland. A high incidence of **ink spot of aspen** continued along the Churchill Road near Happy Valley and moderate damage of foliage occurred in the Sops Arm area near White Bay. Low rainfall caused **drought** symptoms of dry and curled foliage on hardwoods in several areas throughout the Island.

Frost damage caused damage to current year's foliage of fir and spruce in several areas of the Island. Severe winter drying of pines occurred on the Avalon Peninsula and on balsam fir along the coast of the Northern Peninsula.

Special surveys and studies conducted by survey rangers included: the reassessment of the ARNEWS plots, surveys of Sitka spruce plantations for Scleroderris canker; remeasurement of permanent sample plots; egg surveys to forecast tree defoliation for 1990 for the hemlock looper, spruce budworm and blackheaded budworm; a survey to determine the distribution and population levels and damage of the balsam woolly adelgid; assisting the Provincial Department of Forestry and Agriculture in determining hemlock looper and blackheaded budworm population levels in pre-spray blocks; sampling 50 permanent sample locations throughout the Island with pheromone traps to monitor and forecast spruce budworm populations; cooperation with Agriculture Canada detecting accidental introductions of the gypsy moth with the use of pheromone traps; sampling for forest tent caterpillar throughout the Island with baited traps for possible introduction of this pest; the monitoring of the black army cutworm in several plantations in central and western Newfoundland; coordinating a control program against the European pine sawfly infested with a virus on pine trees - in cooperation with personnel from Memorial University, St. John's City Park Commission and others; determining the spread of mountain-ash sawfly parasites; and monitoring populations of the masked shrew in four permanent sample plots.

IMPORTANT PESTS

Eastern Hemlock Looper
Lambdina fiscellaria fiscellaria

The general decline of looper populations forecast from fall egg sampling occurred in much of the 1988 infestation. However, moderate and severe defoliation continued on the Northern Peninsula and the Avalon Peninsula in 1989 (Fig. 3). The infestation continued in three separate areas on the Northern Peninsula: near Ten Mile Lake, along Main Brook and near Roddickton. In addition, looper populations were also interspersed with blackheaded budworm populations in the Castors River and Leg Pond area.

Six new but small infestations developed on the Island, four at separate areas along river valleys on the South Coast and two on the Avalon Peninsula: near Flatrock and near Greens Harbour. Existing pockets of infestation on the Avalon collapsed except along Shoe Cove Brook. Infestations on the Island totalled about 9 500 ha of moderate and severe defoliation, and 3 900 ha of light defoliation (Table 1, Fig. 3). High

Table 1. Areas of defoliation caused by the hemlock looper in forested areas of Newfoundland in 1989.

Management Unit No.	Defoliation Class*			
	Light	Moderate	Severe	Total
1	410	229	111	750
7	-	-	199	199
14	-	-	1 023	1 023
17	2 959	296	5 412	8 667
18	525	143	2 086	2 754
Grand Total	3 894	668	8 831	13 393

*Light = 1-25%
Moderate = 26-75%
Severe = 76-100%

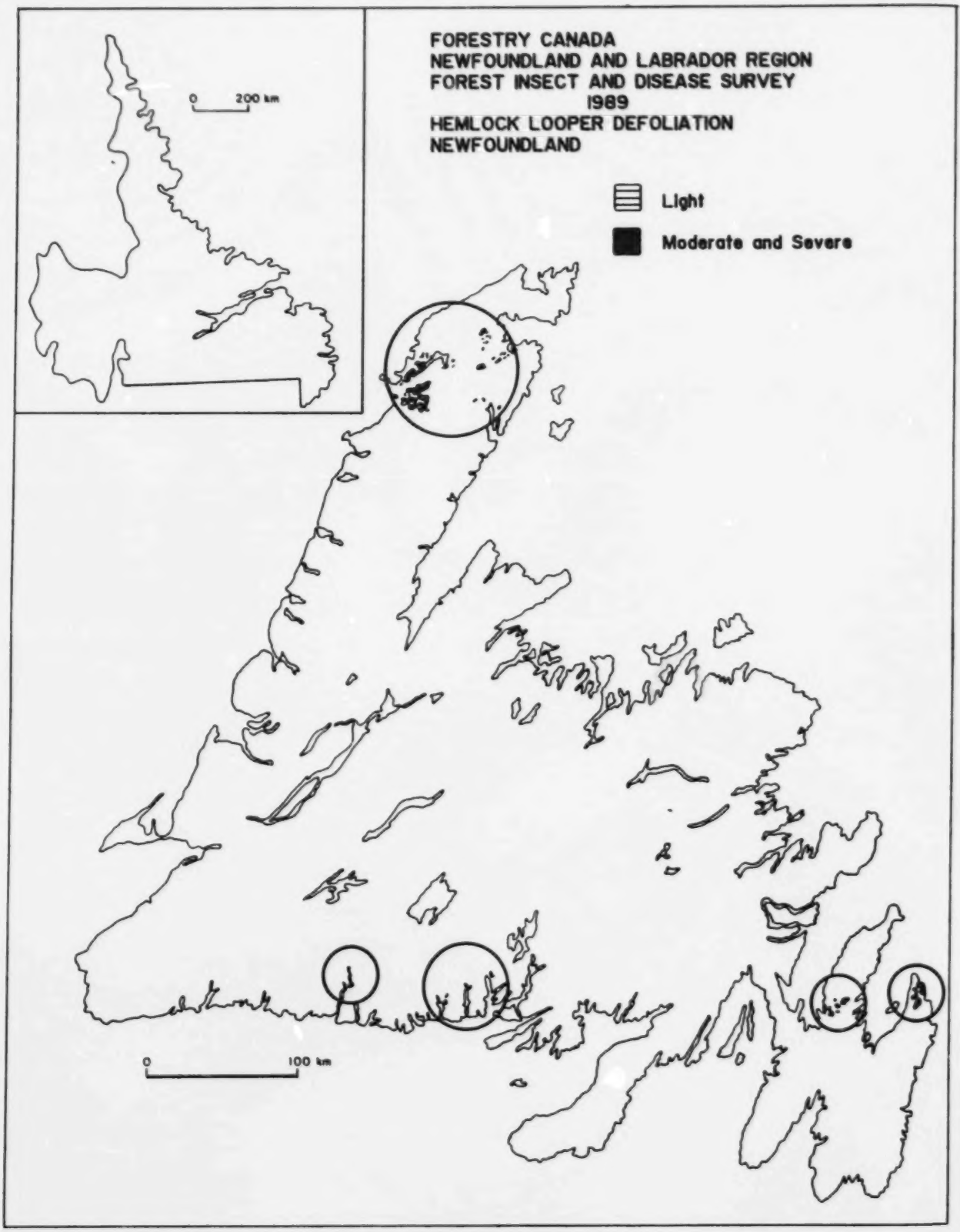

Figure 3. Areas of defoliation by the hemlock looper in forested areas of Newfoundland in 1989.

numbers of looper moths were reported in the Argentia-Placentia area in September, but a local infestation, did not ensue. Aspects of the reproductive biology of this insect were studied in the infestation near Flatrock to devise a moth trapping system to develop a system of forecasting impending looper infestations.

The Provincial Department of Forestry and Agriculture treated about 5 400 ha of a looper infestation with B.t. on the Northern Peninsula (Crummey 1989[1]).

In 1989 hemlock looper larvae and pupae were sampled at two locations. Pupae were also sampled at one additional site on the Avalon Peninsula. Of the 780 larvae reared 3% were parasitized by ichneumonid parasites, 2% were killed by fungi, 11% contained Aureobasidium pullans, less than 1% were infected with a microsporidian tentatively identified as Pleistiphora schubergi, and 3% died of unknown causes for a total larval mortality of 20%. Of the approximately 4,200 pupae collected on the Northern Peninsula, 4% were parasitized by tachinids, and of 1,100 pupae collected on the Avalon Peninsula, 35% were parasitized by tachinids.

Forecast for 1990

Overwintering eggs on branches were sampled in October at 195 locations on the Northern and Avalon Peninsulas. Looper eggs were also obtained from 135 samples collected to forecast blackheaded budworm defoliation in areas where the infestations overlap.

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[1]Crummey, H. 1989. Insect control programs in Newfoundland in 1989. Report to the 17th Annual Forest Pest Control Forum, Ottawa, ON, Nov. 14-16, 1989.

Northern Peninsula - Moderate and severe defoliation is forecast for 61 000 ha and light defoliation for 9 900 ha (Table 2, Fig. 4). These areas include 46 500 ha where the blackheaded budworm is also expected to cause moderate and severe defoliation (Table 3).

Moderate and severe defoliation is forecast to occur from - 1) Squid Cove along Castors River and Leg Pond to 5 km southeast of Leg Pond; 2) West side of Ten Mile Lake east along the Salmon River to 10 km east of Rubes Steady; 3) Main Brook to Second Salmon Pond; 4) West Brook north to the Northwest Arm of Hare Bay; and 5) along Northwest Brook on the west side of Chimney Bay.

Light defoliation is forecast near 1) Hawkes Bay, 2) Roddickton, 3) Beaver Brook, 4) Burnt Village (near Main Brook), 5) Second Salmon Pond, 6) east of Round Lake, 7) Three small areas near Boony Lake, and 8) near Mount St. Margaret.

Avalon Peninsula - Moderate and severe defoliation by the looper is forecast for 1 100 ha and light defoliation for 3 800 ha (Fig. 4).

Moderate and severe defoliation is expected to occur - 1) along the coast near Flatrock on the Northeast Avalon, and 2) near Big Island Pond (Trinity Bay).

Light defoliation is forecast 1) in three small areas across the Peninsula from Green's Harbour to Harbour Grace, 2) near Flatrock, and 3) Tors Cove.

Damage Assessment - Most new tree mortality occurred near Leg Pond where looper populations were the highest and were feeding in conjunction with the blackheaded budworm. Generally the intensity of defoliation was

Table 2. Areas (ha) of defoliation by the hemlock looper forecast in forested areas of Newfoundland for 1990.

Management Unit No.	Defoliation Class*		
	Light**	Moderate & Severe***	Total
1	3 800	1 100	4 900
17	3 700	25 800	29 500
18	6 200	35 200	41 400
Grand Total	13 700	62 100	75 800

*Light = 1-25%
Moderate = 26-75%
Severe = 76-100%

**Areas with low egg density (1-3 eggs/branch).

***Areas with moderate and high egg density (4 or more eggs/branch).

Table 3. Areas (ha) of combined defoliation by the hemlock looper and black-headed budworm forecast in forested areas of Newfoundland for 1990.

Management Unit No.	Total Area (ha)
17	21 100
18	25 400
Grand Total	46 500

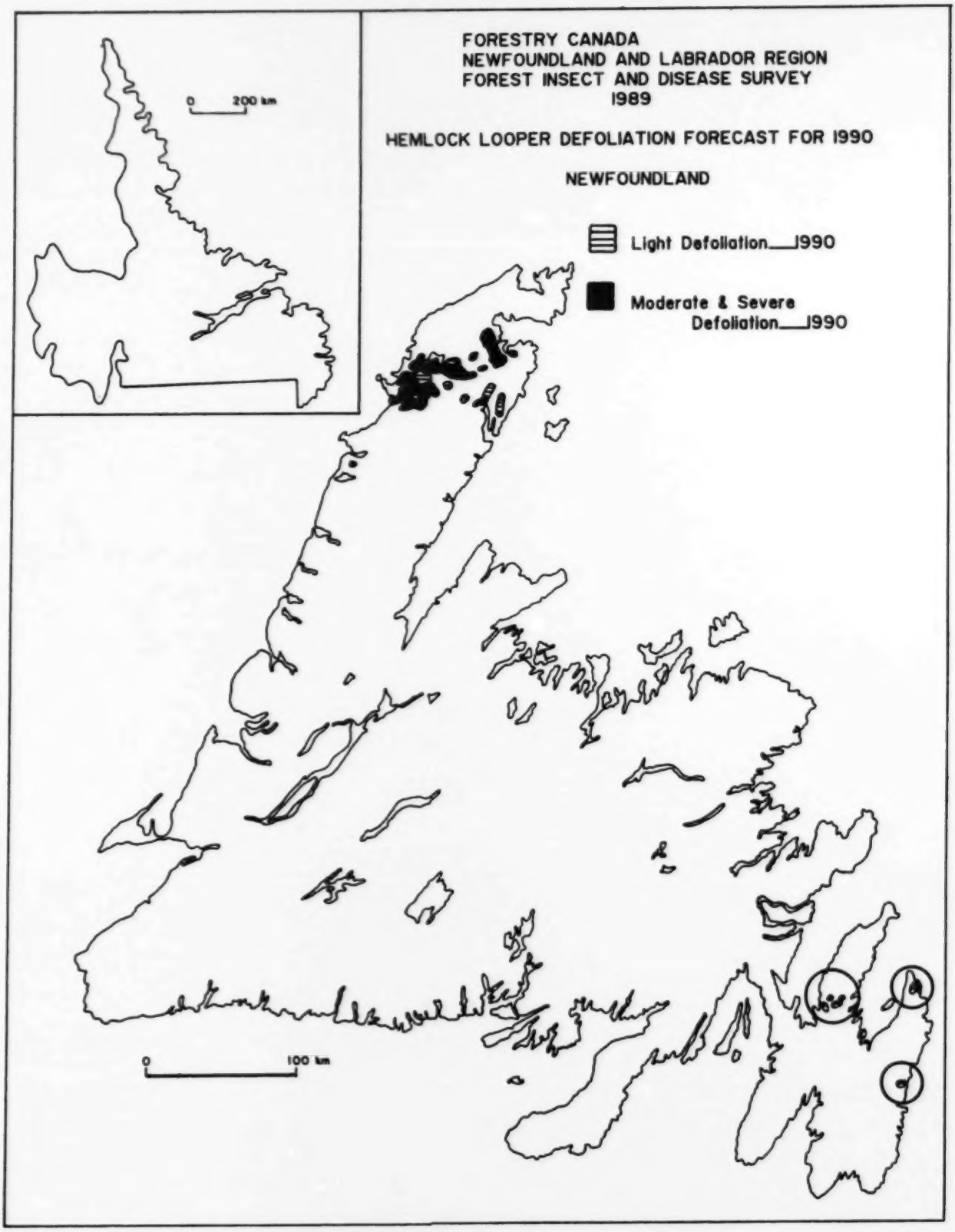


Figure 4. Areas of defoliation by the hemlock looper forecast in forested areas of Newfoundland for 1990.

not as severe as in past years and little new mortality is expected. The damage will be assessed in detail by the Newfoundland Department of Forestry and Agriculture.

Blackheaded Budworm
Acleris variana

The blackheaded budworm has been considered a minor pest in Newfoundland since it was first recorded in 1938. In Newfoundland blackheaded budworm infestations generally occur at intervals of 10 years and usually overlap the declining phase of hemlock looper outbreaks. High population levels are generally concentrated on current foliage in the upper portion of the crown. Outbreaks of this budworm usually subside after about 2 to 3 years without causing tree mortality. Parasites play a major role in the collapse of these infestations.

In 1987 an infestation of about 3 500 ha was recorded during the aerial survey near Ten Mile Lake on the Northern Peninsula and another small infestation of about 1 ha on the Avalon Peninsula. In areas of blackheaded budworm infestations on the Northern Peninsula, the hemlock looper also contributed to the total defoliation, and in a few small areas the spruce budworm was also abundant.

In 1988 the infestation expanded along the Roddickton Road and defoliation by the blackheaded budworm occurred on 8 100 ha. Larval population samples up to 168 larvae per tree caused from 20% to 100%

defoliation on current foliage throughout the whole crown in overmature stands of balsam fir. In some overmature stands trees were moribund and tree mortality seemed imminent. About 5% of the larvae collected in the infested area were parasitized. In the small infestation on the Avalon Peninsula parasitism of larvae was 67%.

In 1989 the infestation continued to increase in size and severity to over 35 000 ha, extending across the Northern Peninsula from St. Barbe to Main Brook (Table 4, Fig. 5). High numbers of larvae, up to

Table 4. Areas (ha) of defoliation caused by the blackheaded budworm in forested areas of Newfoundland from 1987 to 1989.

	Defoliation Class*			
Year	Light	Moderate	Severe	Total
1987	1 600	-	2 300	3 900**
1988	4 389	721	2 999	8 109
1989	6 764	2 239	26 260	35 263

* Light = 1-25%
Moderate = 26-75%
Severe = 76-100%

**Defoliation caused by three species: the blackheaded budworm, to a lesser extent the hemlock looper and a small contribution in local areas by the spruce budworm.

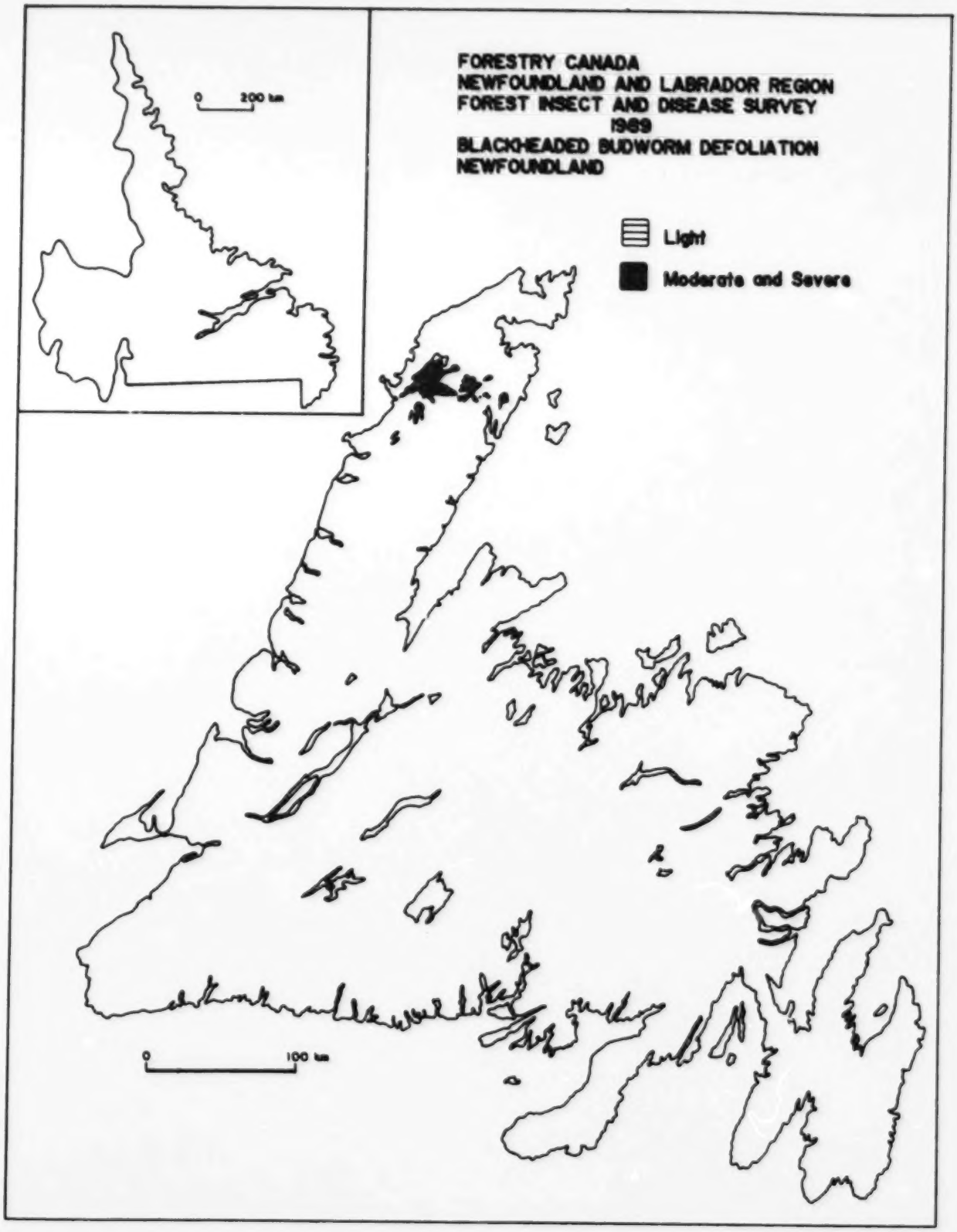


Figure 5. Areas of defoliation by the blackheaded budworm in forested areas of Newfoundland in 1989.

315 per tree sample, were collected throughout the infestation. Moderate and severe defoliation occurred throughout the crowns, mainly in over-mature stands, and only light defoliation in the pre-commercially thinned stands. Larval parasitism increased to 16% by hymenopterous parasites plus 8% by dipterous parasites in 1989. However levels of parasitism are still low and the outbreak will likely continue in 1990. In several areas this budworm was feeding in association with the hemlock looper with both insects contributing to tree mortality.

The small infestation on the Avalon Peninsula collapsed in 1989, and presumably parasitism was the major causal factor.

A spray program planned for the Northern Peninsula in 1989 against the hemlock looper was not as successful as expected because in some areas the blackheaded budworm had caused considerable defoliation before the hemlock looper had emerged and before the sprays were applied.

Forecast for 1990 - Branch samples were collected in the fall at 135 locations throughout the infestation to estimate overwintering egg population levels[1]. Based on these estimates moderate and severe defoliation is forecast to occur on 89 400 ha (Table 5, Fig. 6) including 46 500 ha where hemlock looper is also forecast to cause moderate, severe and some light defoliation (Table 3). Light defoliation is also forecast for 2 000 ha.

---

[1]Low = 1-200
Medium = 201-400
High = 401-800
Extreme = 800+

Table 5. Areas (ha) of defoliation by the blackheaded budworm forecast in forested areas of Newfoundland for 1990.

Management Unit No.	Defoliation Class*		
	Light	Moderate and Severe	Total
17	500	28 200	28 700
18	1 500	61 200	62 700
Grand Total	2 000	89 400	91 400

*Light = 1-25%
Moderate = 26-75%
Severe = 76-100%

Moderate and severe defoliation is forecast for areas from 1) the headwaters of the East River north to Green Island Pond; St. Margaret's Bay east to Chimney Bay; north to First Salmon Pond, 2) Bide Arm to Coles Pond, and 3) five separate areas outside the main infestation. Light defoliation is forecast on four small areas outside the perimeter of the main infestation.

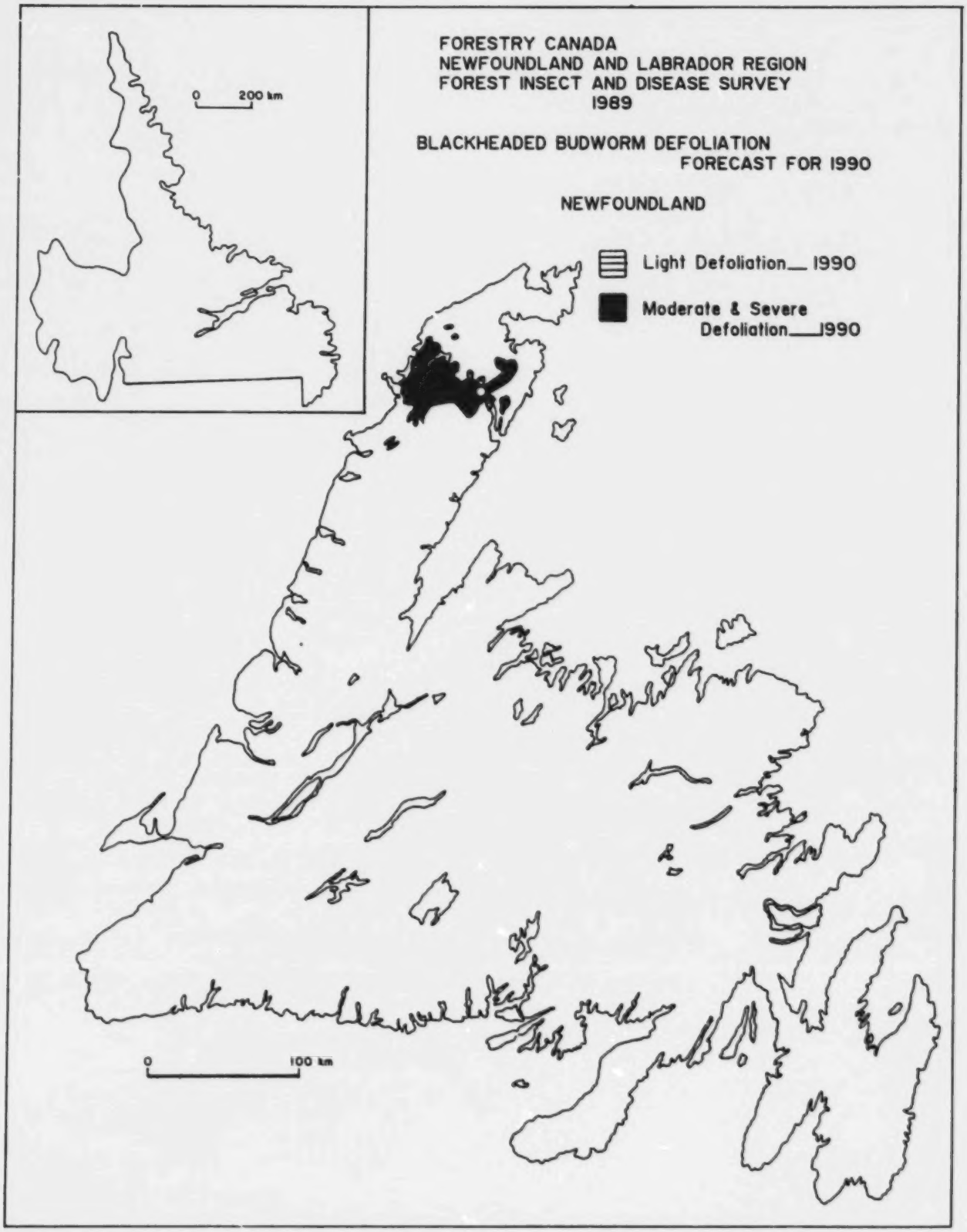


Figure 6. Areas of defoliation by the blackheaded budworm forecast in forested areas of Newfoundland for 1990.

Spruce Budworm
Choristoneura fumiferana

Two new infestations of this budworm were recorded in 1989, one near the North Branch of the Codroy River in western Newfoundland and the other along La Poile River on the South Coast. Three small older infestations, two in the Codroy Valley and one on the Baie Verte Peninsula, decreased in size and all had reduced population levels in 1989. These three old infestations have continued since the collapse of the last budworm outbreak. Outside of the infestation areas larval populations were low. Moderate and severe defoliation was recorded on 1000 ha and light defoliation on 66 ha (Table 6, Fig. 7).

There was no experimental or operational control program against the spruce budworm in 1989.

Table 6. Areas (ha) of defoliation caused by the spruce budworm in forested areas of Newfoundland in 1989.

Management Unit No.	Defoliation Class			Total
	Light	Moderate	Severe	
7	-	-	270	270
14	66	35	699	800
Total	66	35	969	1 070

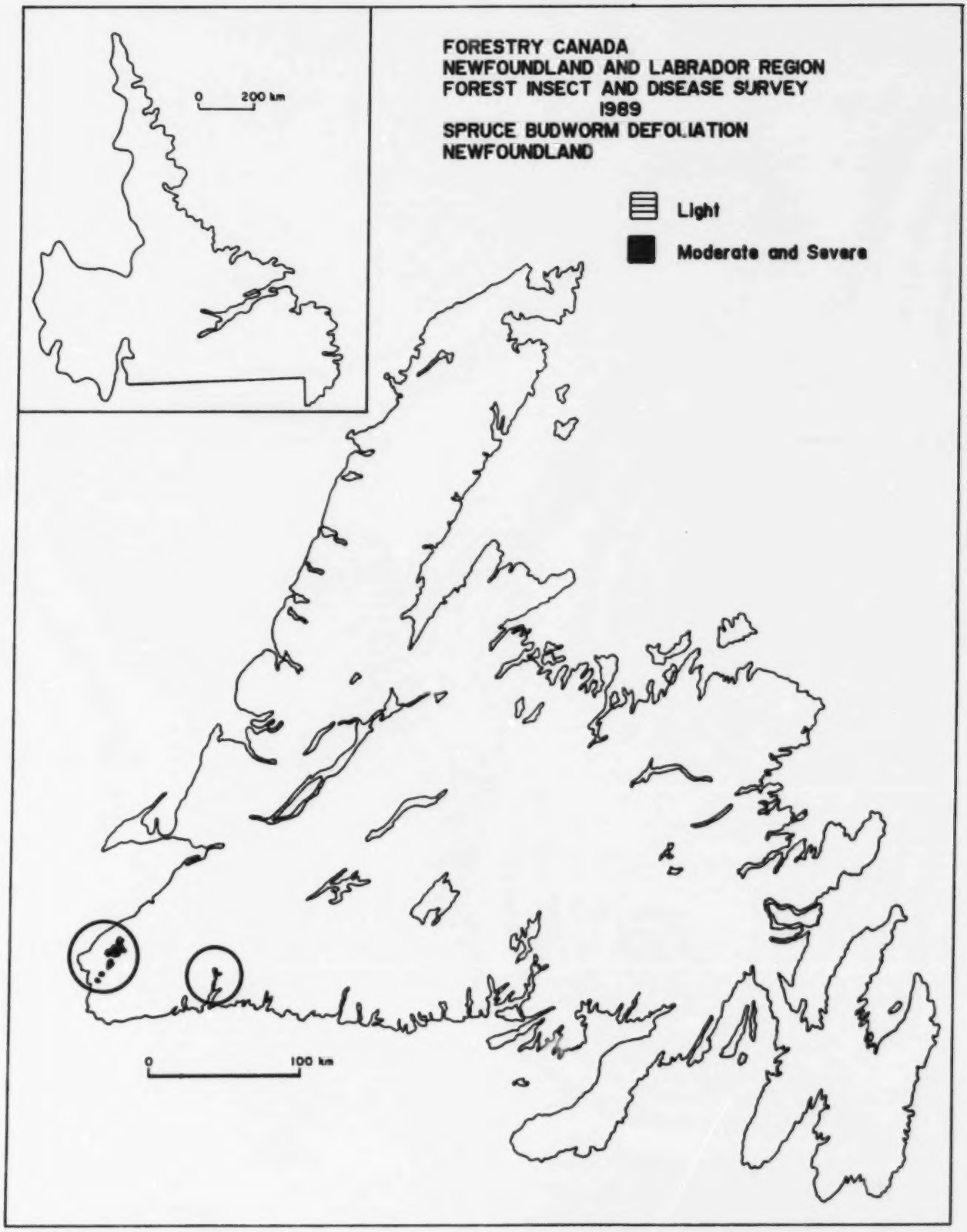


Figure 7. Areas of defoliation by the spruce budworm in forested areas of Newfoundland in 1989.

In 1989 larvae were intensively sampled in the area of infestations and extensively throughout the Island. In the declining infestation on the Baie Verte Peninsula 30% of the 323 larvae sampled were parasitized by Glypta fumiferana, 18% were dead and contained Aureobasidium pullulans, 4% were killed by the fungus Entomophaga aulicae, about 1% were infected with Nosema fumiferana, and about 7% died containing unidentified organisms for a total late-larval mortality of 60%.

Larval mortality of samples from other areas throughout the Island was only 1.4% of 71 larvae collected.

Pheromone traps were placed at 50 permanent sample locations throughout the Island. The total number of moths trapped increased from 186 in 1988 to 3130 in 1989. The highest number recorded were along the west coast, but not near areas of infestations. The trap locations with the highest numbers were near Stephenville 454, Gros Morne National Park 447, Daniels Harbour 881, and Hawkes Bay 643. Almost all of the 21 trap locations in central Newfoundland caught at least a few moths but of 8 trap locations in eastern Newfoundland moths were trapped only in St. John's (two moths). In 1989 two baits were used in western and central Newfoundland. The bio-lure was placed in all traps in western and central areas and the PVC were placed in separate traps in only a few locations to compare results. The PVC baits were more effective than

the bio-lure. We believe almost all moths trapped had been transported into Newfoundland by warm air-masses from mainland Canada, because many moths were found in traps before local moths had emerged.

Forecast for 1990 - Overwintering larval populations were sampled in 430 locations in conjunction with the hemlock looper egg sampling in October. Moderate and severe defoliation, covering 3100 ha is forecast to occur in three areas; near North Branch, Sally's Cove and Southwest Brook on the Baie Verte Peninsula. Light defoliation, covering 15 600 ha, is forecast in numerous small patches distributed from the Codroy Valley to Main Brook on the Northern Peninsula and from Red Indian Lake to Bay d'Espoir in central Newfoundland (Table 7, Fig. 8).

Table 7. Areas (ha) of defoliation by the spruce budworm forecast in forested areas of Newfoundland for 1990.

Management Unit No.	Defoliation Class*		
	Light	Moderate and Severe	Total
7	295	-	295
9	2 281	507	2 788
10	613	-	613
11	349	-	349
12	303	-	303
13	386	-	386
14	4 216	2 240	6 456
15	2 000	-	2 000
16	445	-	445
17	2 596	-	2 596
18	1 128	-	1 128
Total	14 612	2 747	17 359
GMNP	994	380	1 374
Grand Total	15 606	3 127	18 733

*Light = 1-25%
Moderate = 26-75%
Severe = 76-100%

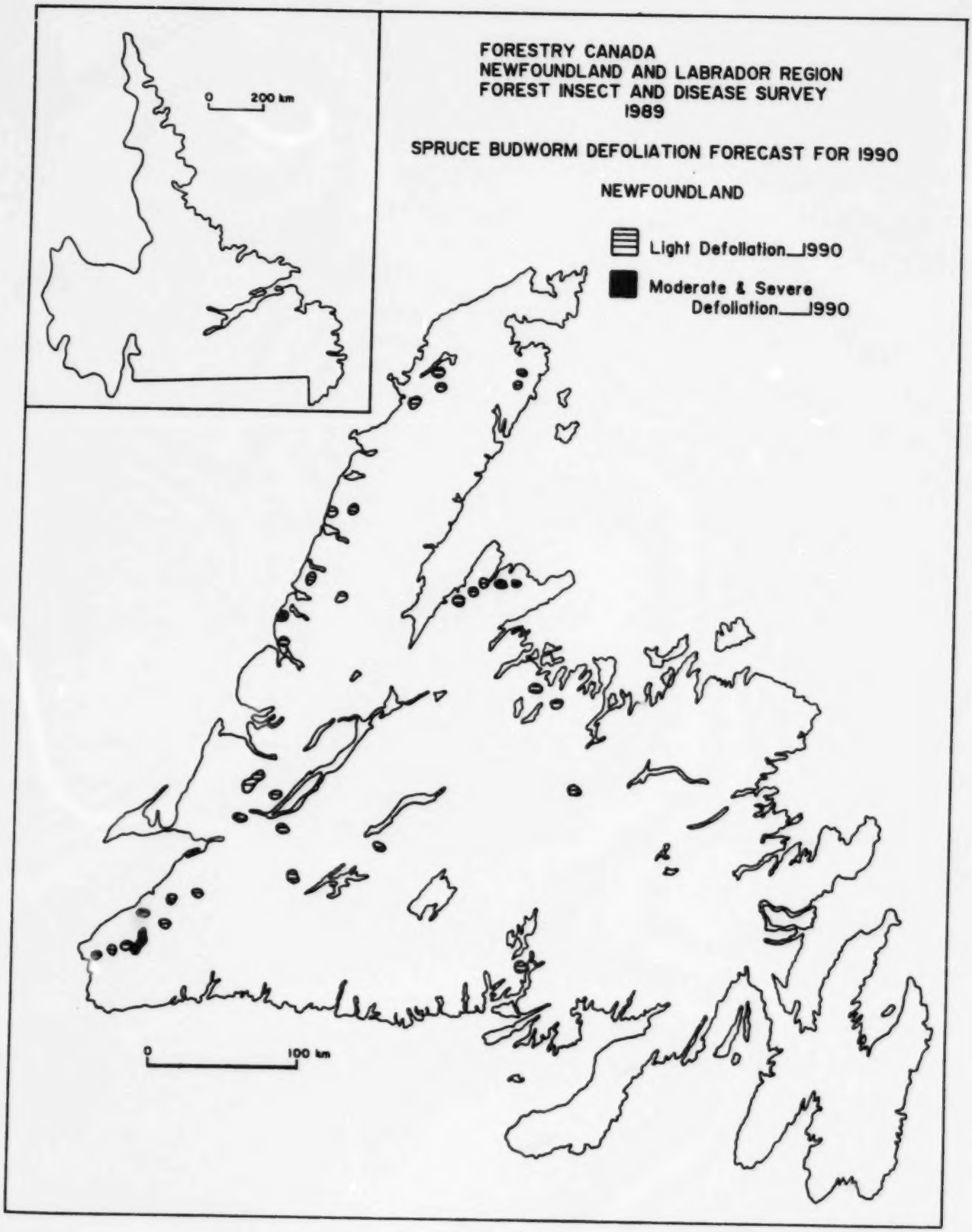


Figure 8. Areas of defoliation by the spruce budworm forecast in forested areas of Newfoundland for 1990.

Balsam Woolly Adelgid
Adelges piceae

The last adelgid outbreak, from 1949 to 1967, caused considerable damage and tree mortality in fir stands throughout southwestern areas of the Island.

The present outbreak of this pest began in 1979 and population levels have been steadily increasing. Adelgid populations have been monitored throughout the Island over the past several years and damage has been increasing annually in young stands of balsam fir. In 1988 a preliminary survey of active infestations in thinned stands established base-line population data for such stands. About 90% of these damaged stands occur in western Newfoundland.

In 1989 western and central Newfoundland was intensively surveyed for population levels to delineate the distribution of high populations and damage. Results of the survey showed moderate to high adelgid concentrations in management units 5, 8, 14 and 15. Low populations were recorded in management units 9, 10, 11, 12 and 16 (except for one location in M.U. 12 where moderate numbers were found). Negative results were obtained from Gros Morne National Park and management units 17 and 18.

In 1988-89 research to develop effective, practical controls have also been initiated by staff of the Newfoundland and Labrador Region in cooperation with the Forest Pest Management Institute of Forestry Canada.

Balsam Fir Sawfly
Neodiprion abietis

Population levels of this sawfly were extremely high along the Lower Salmon River to St. Joseph's Cove, Bay d'Espoir and along the White Bear River on the Southwest Coast. Stands consisting of stunted balsam fir in the river valleys and vigorous young stands in the Bay d'Espoir area were severely damaged.

Moderate and severe defoliation occurred on 1 230 ha in the Bay d'Espoir area and on 55 ha in the White Bear River infestation. Light defoliation occurred on about 112 ha in the St. Joseph's Cove area (Table 8, Fig. 9).

Table 8. Areas (ha) of defoliation caused by the balsam fir sawfly in forested areas of Newfoundland in 1989.

Management Unit No.	Defoliation Class*			Total
	Light	Moderate	Severe	
7	112	135	1 098	1 345
14	-	-	55	55
Total	112	135	1 153	1 400

* Light - 1%-25%
Moderate - 26%-75%
Severe - 76%-100%

Black Army Cutworm
Actebia fennica

Population levels of the cutworm were low in most areas infested in 1988 in western and central Newfoundland.

Plantations near Crabbes River, Journois Brook, Windsor, Red Cliff and Northwest Gander River were expected to have high numbers of

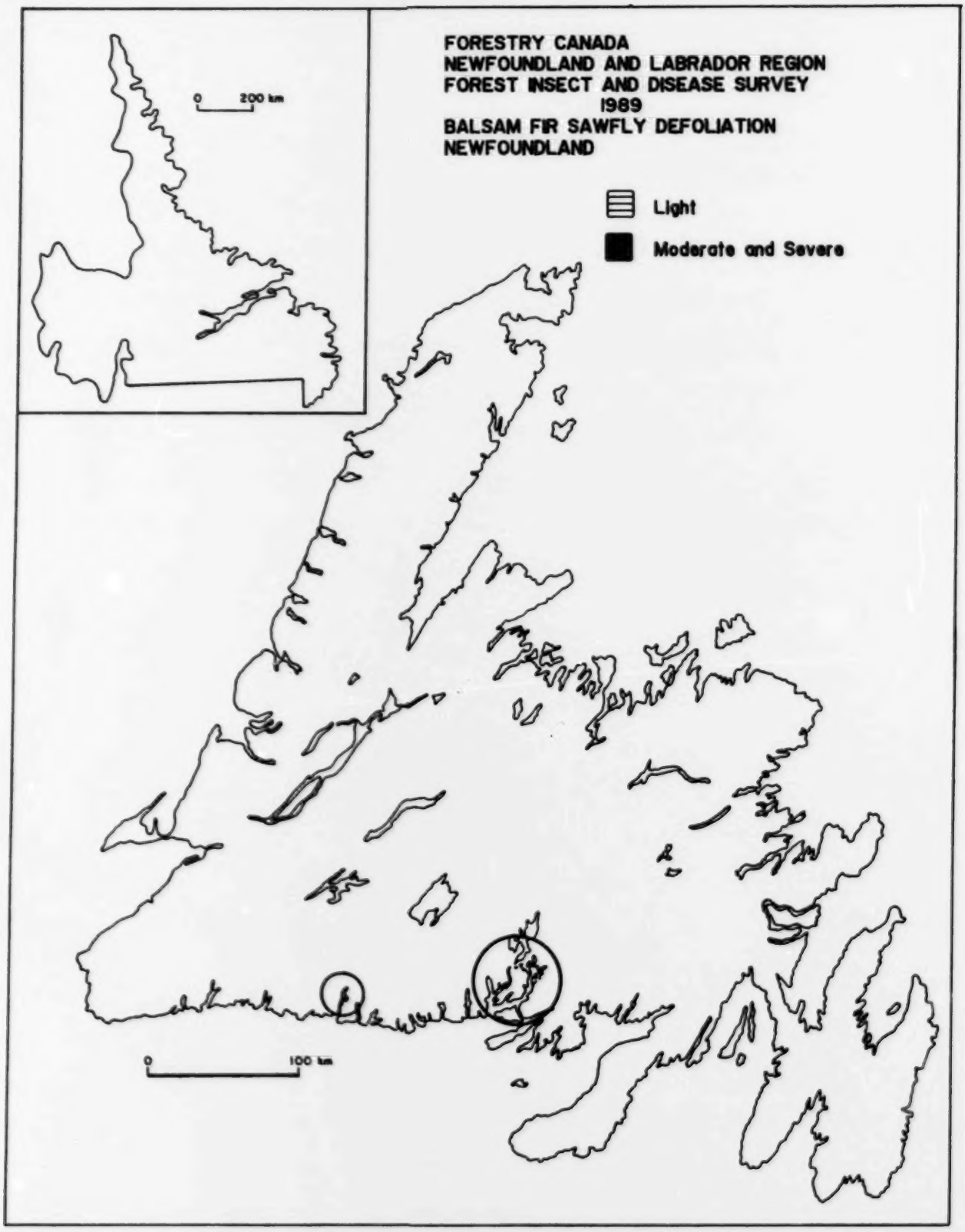


Figure 9. Areas of defoliation by the balsam fir sawfly in forested areas of Newfoundland in 1989.

larvae based on the high moth counts in pheromone traps in 1988. However, in past years cutworm populations usually collapse during the third year of the outbreak.

Pheromone traps placed in 1989 infested areas attracted only a few moths. However, traps placed in a 1989 burned area near Pynn's Brook caught high numbers of moths.

Forestry Canada in cooperation with Memorial University of Newfoundland tested the use of nematodes for a biological control of the cutworm near Heatherton.

Larch Sawfly
Pristiphora erichsonii

The infestation on the Avalon Peninsula decreased in 1989 and only light defoliation was recorded in the Avondale area. This was the sixth year of infestation and only scattered branch and crown mortality occurred. The shrew trapping in the four permanent plots across the Island continued with little change in population levels from 1984 to 1989 (Table 9).

Table 9. Estimated number of shrews per hectare from 1984 to 1989 in Newfoundland.

	October					
Location	1984	1985	1986	1987	1988	1989
St. Georges	2.15	3.21	2.15	1.09	6.44	4.30
Halls Bay	6.45	3.21	2.15	2.15	5.73	3.21
Terra Nova	10.80	-	6.42	3.24	5.73	6.44
Paddy's Pond	5.39	2.15	5.39	4.30	-	8.60

European Pine Sawfly
Neodiprion sertifer

Accidentally introduced to the St. John's area in 1974 this insect has spread throughout the metropolitan areas of St. John's, Mount Pearl and to Conception Bay.

Forestry Canada personnel in cooperation with Memorial University of Newfoundland, municipal parks and other agencies conducted a control program with a nuclear polyhedrosis virus to protect ornamental pine trees on the University campus and in parks.

Birch Casebearer
Coleophora serratella

Population levels of the casebearer have increased during the last two years throughout the Island. In 1989 severe browning of foliage and bud kill of white birch was common in western areas from Doyles to Hawkes Bay and from Deer Lake to Baie Verte. In central and eastern areas moderate and severe damage occurred along the Trans Canada Highway and secondary roads. The most severe damage recorded was between Badger and the Baie Verte Junction, along Bay d'Espoir Road and Gander Bay Road and near Gambo, Clarenville and St. John's.

Satin Moth
Leucoma salicis

High populations of this pest caused severe defoliation of poplars and willows in several towns along the east coast.

Poplars in the Glovertown and Terra Nova Village received the most severe damage with complete defoliation of foliage.

The insect was also abundant and caused severe defoliation of poplars and willows in several gardens in St. John's and Mount Pearl. The infestation reported at Badger and Millertown Junction areas in 1988 collapsed as larvae were affected by a virus.

Mountain-Ash Sawfly
Pristiphora geniculata

Population levels of the sawfly were high throughout the Island. A parasite of the sawfly was introduced from Quebec in 1981 to the St. John's area where it has become established. The parasite was translocated from St. John's to the Pasadena area and has become established in that area as well.

Poplar Serpentine Leafminer
Phyllocnistis populiella

Several large infestations by the leafminer were recorded in central Newfoundland in 1988. Most of the infestations continued in 1989 near the intersection of the Trans Canada Highway and the Bay d'Espoir Highway, Aspen Brook Provincial Park and in Glenwood Provincial Park.

The leafminer also occurred in high numbers and caused severe discoloration of foliage throughout the Churchill River Valley from Muskrat Falls to the Penas River in Labrador. This infestation has been active for the past seven years.

Gypsy Moth
Lymantria dispar

A total of 50 pheromone baited traps were used in 1989 in co-operation with Agriculture Canada to continue surveys for a possible introduction of the gypsy moth to the Island. Traps were placed in camping sites, parks and near towns to detect accidental introductions of the pest from the mainland. No gypsy moths were caught in 1989. Trap locations are shown in Figure 10.

Forest Tent Caterpillar
Malacosoma disstria

A total of 100 pheromone baited traps were used to survey for this defoliation throughout the Island in 1989. Traps were placed in parks, camping areas and near towns in permanent annual sampling areas to collect moths that might be introduced or be mass transported by air currents from mainland Canada. No moths were caught in these traps in 1989, and none have been caught since 1985 when the population in the Maritime Provinces collapsed. Trap locations shown are in Figure 11.

Shoe-String Root Rot
Armillaria Species

This disease caused some tree mortality in a pre-commercial thinned fir stand in the Hawkes Bay area. The stand was severely damaged by the hemlock looper in 1988 but was recovering before the root rot attack. Spruce and fir trees were also killed in the St. Phillip's area and in a black spruce stand near Crabbes River. Trees in these areas may have been under stress by drought.

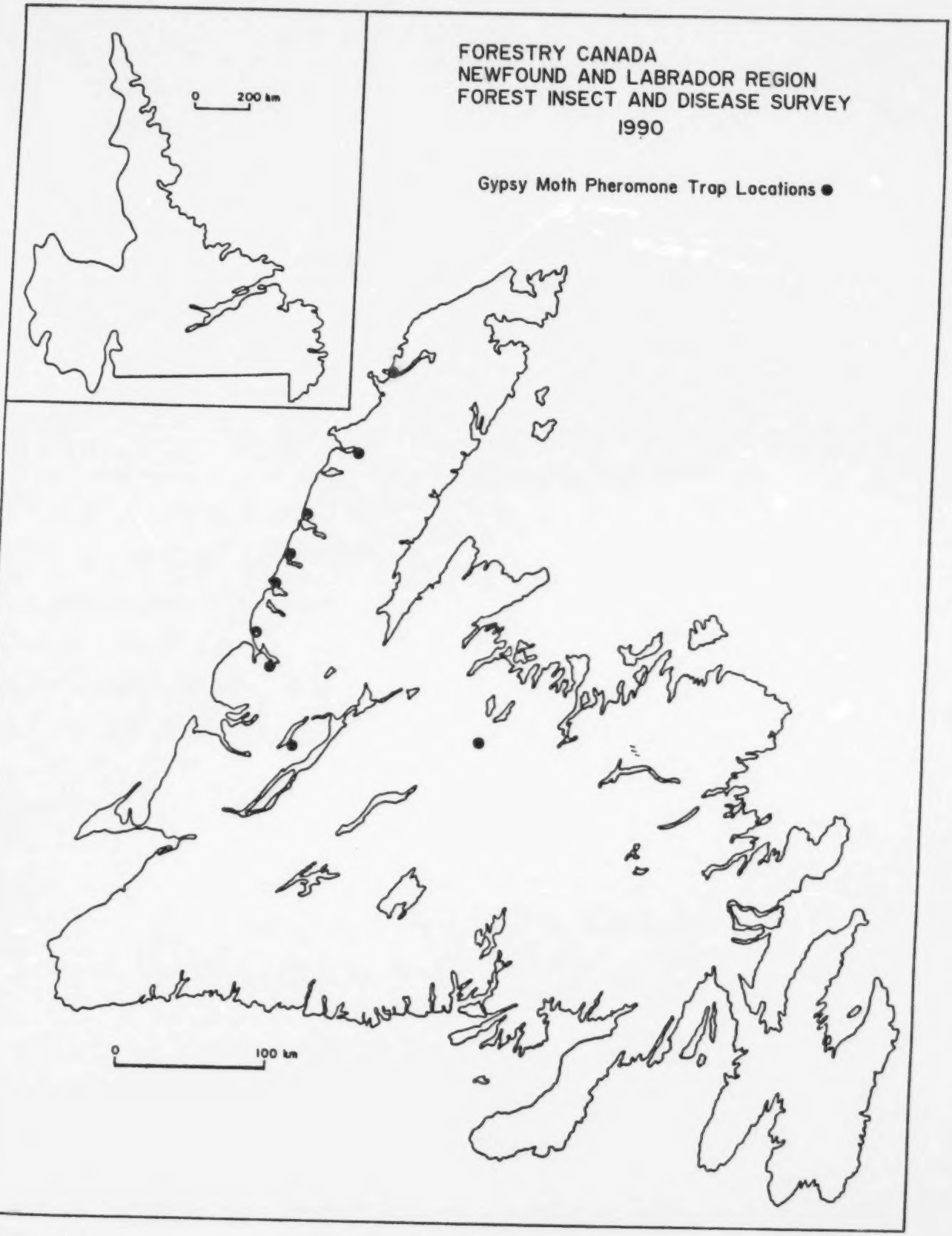
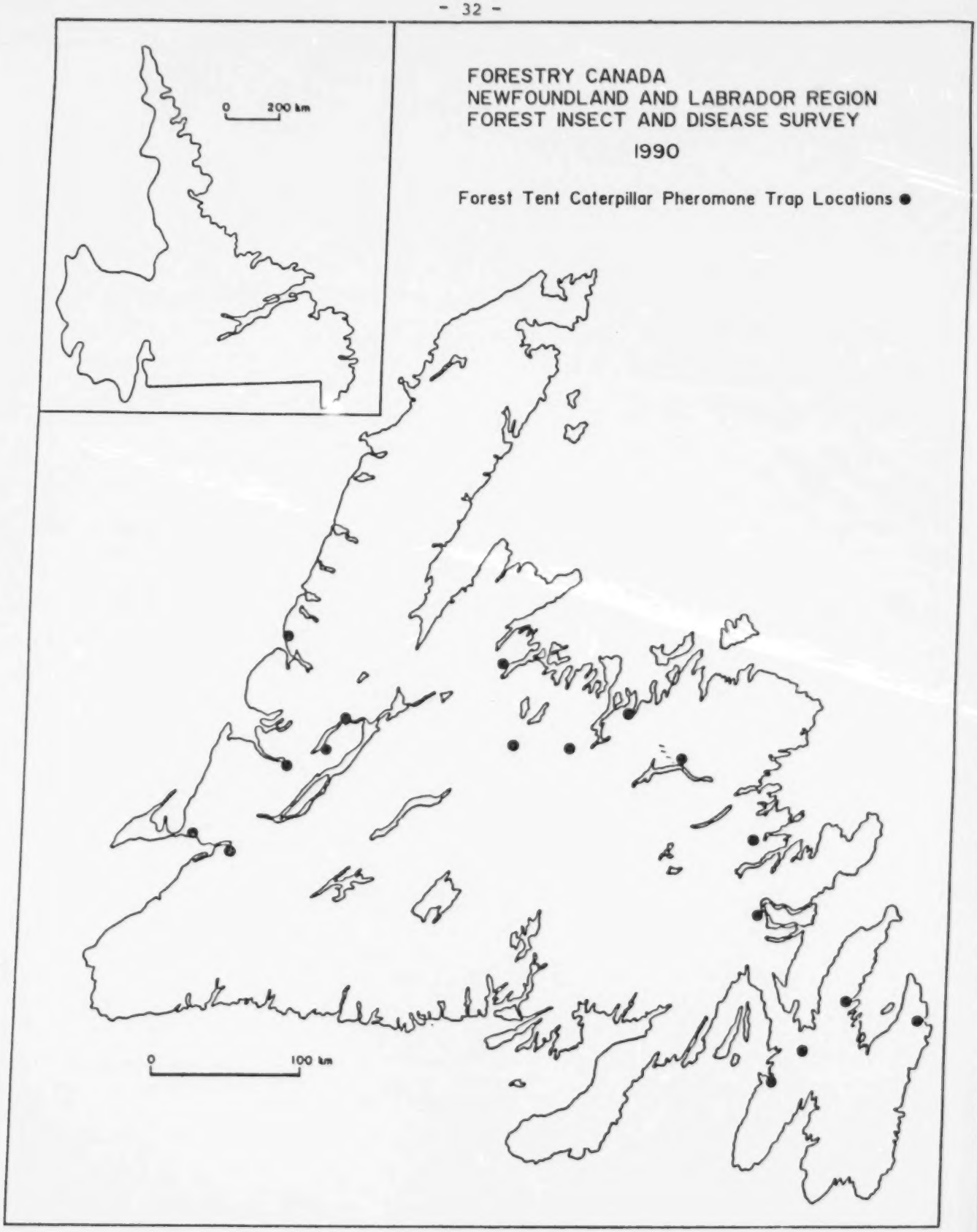

FORESTRY CANADA
NEWFOUND AND LABRADOR REGION
FOREST INSECT AND DISEASE SURVEY
1990
Gypsy Moth Pheromone Trap Locations
0 200 km
0 100 km

Figure 10.


FORESTRY CANADA
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1990
Forest Tent Caterpillar Pheromone Trap Locations
0 200 km
0 100 km

Figure 11.

Scleroderris Canker
Gremmeniella abietina

This canker was first recorded in the St. John's area, on Austrian pine in 1979. In 1987 it occurred on pines on the Salmonier Line and in 1988 it was also found on pines at Colliers Ridge. The first record off the Avalon Peninsula occurred on Sitka spruce near Roddickton in 1985.

Since 1987 the incidence of this canker has increased in the St. John's area with its discovery at several new locations. Pruning and removing infected branches and trees throughout the city in 1988 and 1989 has reduced the incidence of the disease. However, medium to high levels of crown mortality were recorded along the Salmonier Line and Colliers Ridge areas in 1989. Cumulative tree mortality at Salmonier Line was 40% but tree mortality has not occurred at Colliers Ridge. The infested Sitka spruce plantation at Roddickton was inspected and no sign of new or spreading canker infestation was detected.

Eastern Dwarf Mistletoe
Arceuthobium pusillum

This parasitic plant affected scattered black spruce trees of various ages throughout ... (the Island). A black spruce stand near Gambo was sampled in 1989 to determine the rate of spread of the mistletoe. This year the highest number of affected trees was recorded since this stand was surveyed in 1983.

Broom Rust of Balsam Fir
Melampsorella caryophyllacearum

Broom rust of balsam fir has been more prominent this year than in previous years. The most visible infections occurred along the coast near St. Thomas and St. Phillips. Many of the trees had small brooms forming indicating the disease is increasing. A high incidence of this disease was also recorded in Torbay and Outer Cove. In western Newfoundland the disease was found on scattered trees throughout Sops Arm Provincial Park.

European Poplar Canker
Dothichiza populea

European poplar canker affected most of the lombardy poplar trees in Clarenville with up to 95% of the foliage affected on living trees. About 10% of the trees had significant crown mortality. In St. John's this canker continued to affect lombardy poplars and some trees died in 1989.

Winter Drying

Severe drying of pine, spruce and fir were common in several locations throughout the Island in 1989. Light to severe reddening of foliage occurred on balsam fir and white spruce along the west coast of the Northern Peninsula in exposed areas near Sally's Cove and from Parsons Pond to Daniels Harbour. Pines were also damaged throughout St. John's and in the South River and Bay Roberts areas. Sitka spruce plantations on Crescent Lake and Roddickton Roads were also affected. Cold winds in March contributed to the damage.

Frost Damage

Severe frost damage occurred on 400 ha of balsam fir and black spruce regeneration along the road between Northwest and Southwest Gander Rivers. Damage also occurred along Fischel's River where up to 90% of the new shoots of some black spruce trees was affected. Hardwoods were also affected in St. John's where up to 60% of the foliage was damaged.

Drought

Low rainfall caused drought symptoms of dry and curled foliage to occur on hardwood trees in the Notre Dame Provincial Park area, and near Loon Bay in central Newfoundland; near Sheffield Lake, Overfalls Brook and Pasadena in western Newfoundland. In eastern Newfoundland these symptoms were recorded in St. John's, Mount Pearl and Goulds.

OTHER INSECTS AND DISEASES

Insects, disease or damage	Host(s)	Location	Remarks
Balsam twig aphid *Mindarus abietinus* Koch	Balsam fir	Western and central Newfoundland	Low numbers and light damage.
Birch leafminer *Fenusa pusilla* (Lep.)	White birch	Western and central Newfoundland	Low to high numbers. Trace to moderate browning.
Birch-aspen leafroller *Epinotia solandriana* (Linn.)	White birch Trembling aspen	Central Newfoundland	Low numbers and light defoliation.
Black knot *Apiosporina morbosa* (Schw.) Arx	Pin cherry Domestic cherry Damson plum	Throughout Newfoundland	Low to high incidence recorded.
European alder leafminer *Fenusa dohrnii* (Tischb.)	Speckled alder	Western and central Newfoundland	Low to moderate populations. Light to moderate defoliation recorded.
European spruce sawfly *Gilpinia hercyniae* (Htg.)	Black spruce White spruce Balsam fir	Western and central Newfoundland Labrador	Populations low. No significant damage.
Fir coneworm *Dioryctria abietivorella* (Grt.)	White spruce Black spruce	Western Newfoundland	Low populations. No significant damage.
Greenheaded spruce sawfly *Pikonema dimmockii* (Cress.)	Black spruce White spruce Balsam fir	Western and central Newfoundland Labrador	Low populations. No significant damage.
Gray mold blight *Botrytis cinerea* Pers.	Black spruce Heather	Central and eastern Newfoundland	High incidence on black spruce seedlings in Wooddale tree nursery in central Newfoundland.

OTHER INSECTS AND DISEASES ... (Cont'd.)

Insects, disease or damage	Host(s)	Location	Remarks
Ink spot of aspen *Ciborinia whetzelii* (Seav.) Seav.	Trembling aspen	Western Newfoundland Labrador	Moderate incidence in western Newfoundland where 20% of the foliage along Sop's Arm Road was affected. Low incidence in Labrador.
Leaf and shoot blight *Pollacia elegans* Serv.	Balsam poplar	Avalon Peninsula	Low incidence in St. John's.
Venturia macularis (Fr.) Müll. & Arx	Trembling aspen	Western and central Newfoundland Labrador	Common and widespread. Low and moderate incidences in several areas throughout western and central Newfoundland. The highest incidence occurred in Beothuck Provincial Park where 60% of the foliage was affected. A low incidence also occurred along Churchill road in Labrador.
Larch casebearer *Coleophora laricella* (Hbn.)	Tamarack	Western Newfoundland	Moderate populations. 30% and 50% defoliation recorded at two locations.

OTHER INSECTS AND DISEASES ... (Cont'd.)

Insects, disease or damage	Host(s)	Location	Remarks
Leaf spot *Entomosporium mespili* (DC. ex Duby) Sacc.	American mountain-ash Hawthorn	Avalon Peninsula	New host record for American mountain-ash. Up to 85% of the foliage of ornamental hawthorn dropped prematurely in the St. John's area.
Marssonina brunnea (Ell. & Ev.) Sacc.	Hybrid poplar	Avalon Peninsula Burin Peninsula	Low incidence recorded in urban areas.
Mycosphaerella colorata (Pk.) Earle	Sheep laurel	Bonavista Peninsula	Low incidence. 10% of the foliage affected.
Mourning cloak butterfly *Nymphalis antiopa* (L.)	Willow Trembling aspen	Eastern Newfoundland Labrador	Low to moderate numbers. Light to moderate defoliation on few trees.
Nectria dieback and canker *Nectria cinnabarina* Tode ex Fr.	Silver maple Sycamore maple Horse chestnut American elm American mountain-ash	Avalon Peninsula	Low incidence on ornamental hardwoods in urban areas.
Needle blight *Didymascella thujina* (Durand) Maire	Northern white cedar	Western Newfoundland	Low to moderate incidence. Up to 15% of the foliage of all northern white cedar trees affected at Pasadena.
Needle cast *Isthmiella faullii* (Darker) Darker	Balsam fir	Labrador	Low incidence. Up to 10% of old foliage affected along Grand Lake Road.
Rhizosphaera kalkhoffii Bubak	Blue spruce	Avalon Peninsula	Low incidence recorded at Carbonear.

OTHER INSECTS AND DISEASES ... (Cont'd.)

Insects, disease or damage	Host(s)	Location	Remarks
Shoot blight *Sirococcus strobilinus* Preuss	White spruce	Central Newfoundland	Five to 10% incidence on approximately 1 ha area of white spruce seedlings.
Shot hole *Coccomyces hiemalis* Higgins	Pin cherry	Eastern Newfoundland	Moderate incidence. Up to 25% of the foliage affected on 80% of the trees in a stand near Thorburn Lake.
Spruce bud moth *Zeiraphera canadensis* Mut. & Free.	White spruce Blue spruce Balsam fir	Western and eastern Newfoundland	Low populations. Moderate damage recorded on blue spruce at Pasadena arboretum.
Spruce coneworm *Dioryctria reniculelloides* Mut. & Mun.	Black spruce White spruce Balsam fir	Western, central and eastern Newfoundland	Low populations and no significant damage.
Spruce spider mite *Oligonychus ununguis* (Jac.)	White spruce Blue spruce	Avalon Peninsula	High populations found on various spruce species in the St. John's area, causing foliage to turn brown and drop prematurely.
Stem and branch canker *Cytospora chrysosperma* (Pers.) Fr.	American mountain-ash	Avalon Peninsula	Up to 80% of the shoots affected on ornamental trees in the St. John's area.
Cytospora species	American mountain-ash	Avalon Peninsula	Low incidence. Leaves dying and prematurely dropping off on one ornamental tree in Mount Pearl.

OTHER INSECTS AND DISEASES ... (Cont'd.)

Insects, disease or damage	Host(s)	Location	Remarks
Fusarium species	American mountain-ash	Avalon Peninsula	Low incidence occurred on ornamentals in St.John's and Mount Pearl in conjunction with *Cytospera sp.*
Stem girdle *Cucurbidothis pityophila* (Fr.) Petrak	White pine	Eastern Newfoundland	Low incidence. Up to 10% of the branches affected on semi-mature trees in Terra Nova National Park.
Taphrina witches' broom *Taphrina cerasi* (Fckl.) Sadeb.	Pin cherry	Western Newfoundland Labrador	Low incidence. Few trees affected in both localities.
Tar spot *Rhytisma prini* (Schw.) Fr.	Mountain holly	Eastern Newfoundland	New record for Newfoundland. 10% of the foliage affected.
Threelined larch sawfly *Anoplonyx luteipes* (Cress.)	Tamarack	Western Newfoundland Labrador	Low population and no significant damage.
Uglynest caterpillar *Archips cerasivorana* (Fitch)	Pin cherry	Western Newfoundland	A high number of nests recorded near Little Rapids.

OTHER INSECTS AND DISEASES ... (Concl'd.)

Insects, disease or damage	Host(s)	Location	Remarks
Willow blight *Fusicladium saliciperdum* (All. and Tub.) Lind.	Laurel willow Weeping willow Golden willow	Eastern Newfoundland Avalon and Burin Peninsulas	Up to 20% of the foliage affected on 50% of ornamental willows at St. John's. High incidence on golden willow at Gambo in eastern Newfoundland.
Physalospora miyabeana Fukushi	Laurel willow Weeping willow Golden willow	Eastern Newfoundland Avalon and Burin Peninsulas	In conjuction with *Fusicladium saliciperdum*.
Willow leaf beetle *Chrysomela falsa* Brown	Willow Balsam poplar	Western Newfoundland Labrador	Low to moderate numbers. A trace to 50% defoliation in Labrador.
Yellow leaf blister *Taphrina populina* Fr.	Lombardy poplar	Avalon Peninsula	Low incidence. Up to 10% of the foliage affected on ornamentals in urban areas.